

REMARKS

Claim 1 is amended to recite "a transparent optical element bonded to said stack by a bond at an interface disposed between said optical element and said stack, wherein said bond is substantially free of organic-based adhesives." This amendment is supported by, for example, page 9, line 5 to page 11, line 6, which describes embodiments containing a bonding material and lists several examples of materials that are not organic-based adhesives, and by page 15, lines 7-21, which describes embodiments with no bonding material between the optical element and the stack.

An information disclosure statement accompanying this submission lists U.S. Patent No. 6,483,196 to Wojnarowski et al. (hereinafter "Wojnarowski I") and U.S. Patent No. 6,412,971 to Wojnarowski et al. (hereinafter "Wojnarowski II").

Wojnarowski I teaches at column 1, lines 56-59 "[o]ne or more layers of a lensing material is deposited on a bottom surface of the device substrate. The lensing material is comprised of a polymer, an index matching material, or a mixture thereof." Table 1 at column 5, lines 17-39 lists several examples of suitable polymer materials. Since Wojnarowski I teaches the use of a polymer as the lensing material, Wojnarowski I does not teach a bond that is substantially free of "organic-based adhesives" as recited in claim 1.

Wojnarowski II teaches at column 5, lines 37-40 "in one embodiment, as shown in Fig. 10, the reradiative component comprises a plurality of lenses 64 with each lens being situated over a respective one of the LESDs. In one embodiment, lenses 64 are attached by a bonding glue." Since a person of skill in the art would understand "bonding glue" to refer to organic-based adhesives, Wojnarowski II does not anticipate Claim 1.

Applicants can find no teaching in Wojnarowski I or II of a transparent bonding layer "formed from a material selected from the group of optical glass, chalcogenide glass, III-V semiconductors, II-VI semiconductors, group IV semiconductors, metals, metal oxides, metal

fluorides, yttrium aluminum garnet, phosphides, arsenides, antimonides, nitrides, and combinations thereof" as recited in claim 32.

Applicants can find no teaching in Wojnarowski I or II of a "stack of layers compris[ing] at least one III-Phosphide semiconductor layer and said first contact and said second contact are disposed on a same side of said stack" as recited in claim 51.

Applicants can find no teaching in Wojnarowski I or II of an "optical element compris[ing] one of zirconium oxide, sapphire, materials containing lead oxide, SiC, ZnS and sapphire" as recited in claim 53.

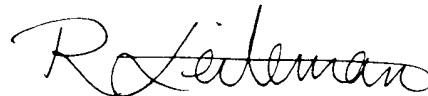
All other claims depend from claims 1, 32, 51, and 53 and are therefore also allowable over Wojnarowski I and II.

In view of the above arguments, Applicants respectfully request allowance of all claims. Should the Examiner have any questions, the Examiner is invited to call the undersigned at (408) 382-0480.

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Respectfully submitted,



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ATTACHMENT A

IN THE CLAIMS

The claims are amended as follows:

1. (Twice Amended) A light emitting device having a stack of layers including semiconductor layers comprising an active region, said device comprising:

a transparent optical element bonded to said stack by a bond at an interface disposed between said optical element and said stack, wherein said bond [does not include epoxy] is substantially free of organic-based adhesives.

32. (Amended) [The light emitting device of Claim 31,] A light emitting device having a stack of layers including semiconductor layers comprising an active region, said device comprising:

a transparent optical element bonded to said stack by a bond at an interface disposed between said optical element and said stack; and

a transparent bonding layer disposed between said optical element and a surface of said stack, said transparent bonding layer bonding said optical element to said stack;

wherein said transparent bonding layer is formed from a material selected from the group of optical glass, chalcogenide glass, III-V semiconductors, II-VI semiconductors, group IV semiconductors, [organic semiconductors,] metals, metal oxides, metal fluorides, yttrium aluminum garnet, phosphides, arsenides, antimonides, nitrides, and combinations thereof.

53. (Amended) A light emitting device having a stack of layers including semiconductor layers comprising an active region, said device comprising:

an optical element bonded to said stack; and

a first contact and a second contact electrically coupled to apply a voltage across said active region;

wherein said stack of layers comprises at least one III-Nitride semiconductor layer and said first contact and said second contact are disposed on a same side of said stack, and wherein said optical element comprises one of zirconium oxide, materials containing lead oxide, SiC, ZnS and sapphire.

Please add the following new claims:

65. The light emitting device of Claim 32, wherein said transparent bonding layer includes one or more luminescent materials that convert light of a wavelength emitted by said active region to at least another wavelength.

66. The light emitting device of Claim 32, wherein said bonding layer has an index of refraction greater than about 1.5 for light emitted by said active region.

67. The light emitting device of Claim 66, wherein said index of refraction is greater than about 1.8.

68. The light emitting device of Claim 32, wherein said bonding layer has a thickness less than about 500 Angstroms.

69. The light emitting device of Claim 32, wherein said surface includes a surface of one of said semiconductor layers.

70. The light emitting device of Claim 32, wherein said surface includes a surface of a transparent superstrate layer disposed above said semiconductor layers.

71. The light emitting device of Claim 70, wherein said superstrate layer has a refractive index for light emitted by said active region greater than about 1.8.

72. The light emitting device of Claim 70, wherein said superstrate layer is formed from a material selected from the group of sapphire, SiC, GaN, and GaP.

73. The light emitting device of Claim 70, wherein said optical element comprises one of ZnS, zirconium oxide, materials containing lead oxide, SiC, and sapphire, said

superstrate comprises one of SiC, GaN, and sapphire, and said semiconductor layers comprise a III-Nitride semiconductor.

74. The light emitting device of Claim 73, further comprising a first contact and a second contact electrically coupled to apply a voltage across said active region; said first contact and said second contact disposed on a same side of said stack.

75. The light emitting device of Claim 70, wherein said optical element is formed from one of zirconium oxide, sapphire, materials containing lead oxide, SiC, ZnS, and GaP, said superstrate is formed from a III-Phosphide material, and said semiconductor layers comprise one of III-Phosphide semiconductors and III-Arsenide semiconductors.

76. The light emitting device of Claim 75, further comprising a first contact and a second contact electrically coupled to apply a voltage across said active region; said first contact and said second contact disposed on a same side of said stack.